REMARKS

The Examiner is thanked for the due consideration given the application.

Claims 22-42 remain pending in the application. Acknowledgement of the allowability of claims 25, 28-33 and 37-42 is noted with appreciation. No new matter is believed to be added to the application by this response.

Rejections Based on HEIKKINEN

Claims 22-24 and 35 have been rejected under 35 USC §103(a) as being unpatentable over HEIKKINEN (U.S. Publication 2002/0184009) in view of IKEDA (U.S. Patent 6,031,173).

Claims 26 and 34 have been rejected under 35 USC §103(a) as being unpatentable over HEIKKINEN in view of IKEDA and ALLES (U.S. Patent 4,201,105).

Claim 27 has been rejected under 35 USC §103(a) as being unpatentable over HEIKKINEN in view of IKEDA and THYSSEN et al. (U.S. Patent 6,240,386).
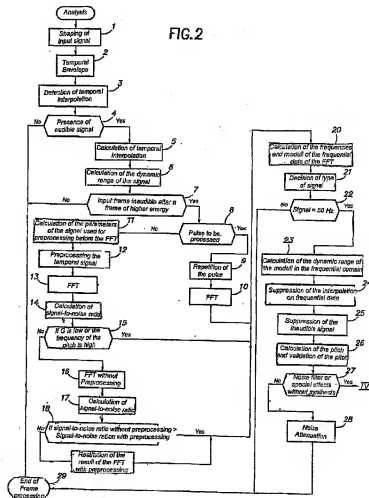
Claim 36 has been rejected under 35 USC §103(a) as being unpatentable over HEIKKINEN in view of IKEDA and ALLES, and further in view of THYSSEN et al.

These rejections are respectfully traversed.

The present invention pertains to differentiated digital processing of a sound signal that includes application to the temporal signal of the inverse variation of the pitch. The

validation of the pitch in the frequency domain improves the

accuracy of pitch determined by calculating the period of the

fundamental.

The present invention is illustrated by way of example,

in Figure 2 of the application, which is reproduced below.

FIG.2

The process schema in Figure 2 is reflected in instant

claim 22, for example, which states:

A method for a differentiated digital processing
of a sound signal, constituted in an interval of a

frame by a sum of sines of fixed amplitude and of which a frequency is modulated linearly as a function of time, this sum being modulated temporally by an envelope, a noise of said sound signal being added to said signal, prior to said sum, comprising:

a stage of analyzing making it possible to determine parameters representing said sound signal by calculating the envelope of the signal,

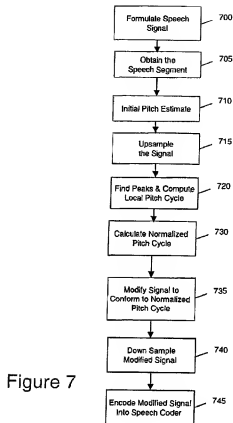*calculating the sound signal of the pitch and its variation,*

applying to a temporal signal of an inverse variation of the pitch a temporal sampling of the sound signal with a variable sampling step, this step varying with an inverse value of the pitch variation,

performing a Fast Fourier Transformation (FFT) of a pre-processed signal,

extracting signal frequential components and their amplitudes from a result of the Fast Fourier Transformation, and

calculating the pitch in a frequential domain and its variation with respect to the previously calculated pitch in order to improve a precision of the previously calculated pitch.

HEIKKINEN pertains to improving voicing determination in speech signals containing high levels of jitter. The process schema of HEIKKINEN is illustrated in Figure 7 of the reference, which is reproduced below.

Figure 7

The Office has admitted that HEIKKINEN does not disclose that "*applying a temporal sampling of the sound signal with a variable sampling step and calculating pitch with respect to the previous calculated pitch.*" Page 4, lines 2-4.

In comparison, paragraph 0050 of HEIKKINEN concerns a Linear Predictive (LP) Coding:

> "*In LP coding analysis it is assumed that the current speech sample can approximately be predicted by a linear combination of the past samples and corresponding transfer function is often called an LP synthesis filter. The inverse of the synthesis filter is called analysis filter and the prediction error signal which is obtained by subtracting the predicted*

> signal from the original signal, is called residual
> signal. In the ideal predictor the spectrum of the
> residual signal is flat."

Paragraph 0050 of HEIKKINEN does not disclose or infer the features of the instant claims 22 and 34 of the present invention.

However, the Office Action considers that HEIKKINEN discloses that "*applying to a temporal signal of an inverse variation of the pitch (inverse; paragraph 0050)*". As mentioned before, paragraph 0050 concerns a Linear Predictive (LP) Coding.

Paragraph 0050 only states that "*The inverse of the synthesis filter is called analysis filter*". For one of ordinary skill in the art, it is clear that the inverse as mentioned in paragraph 0050 is not identical to the inverse variation of the pitch as defined in the present claim 22.
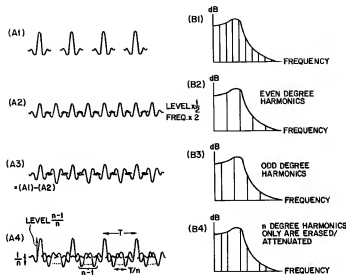
HEIKKINEN does not disclose that "*applying to a temporal signal of an inverse variation of the pitch a temporal sampling of the sound signal with a variable sampling step, this step varying with an inverse value of the pitch variation.*"

The Office Action has cited IKEDA column 23, line 24 – column 25, line 31. This section concerns:

– column 23, lines 23–51, which relates to "*Variations in the odd degree harmonic constitution.*" IKEDA relate to a method in which some of repetitively generated impulse response signals are inverted for their polarities, and particular

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harmonics only are erased/attenuated. Figure 16 of IKEDA

(reproduced below) shows that the impulse response signals are
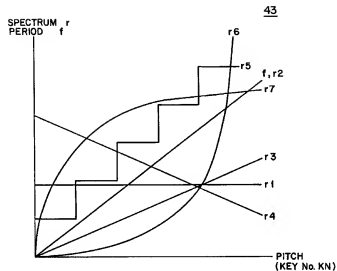
superimposed one upon the other.

FIG. 16

        - column 23, line 52 -column 24, line 28, which

relates to *"Group of spectrum period tables 43."* IKEDA disclose

that the rate of generating the impulse response signals remains

constant or changes relative to the pitch, and the tones of the

fixed formant type or the tones of the moving formant type are

selected. The paragraph starting on column 23, line 24 relates

to Figure 19 which describes the variation of several

characteristics of the spectrum coefficient relative to the pitch

data. On Figure 19 (See below), characteristic r4 of the spectrum

coefficient varies in reverse (inverse) proportion to the pitch

data. This is completely different from the feature of the

present invention which concerns *"applying to a temporal signal*

of an inverse variation of the pitch a temporal sampling of the

sound signal with a variable sampling step."

FIG. 19

- the passage at column 24, lines 29-67, which relates

to *"rf Section tables 44."* This paragraph concerns an rf

selection table in a program unit.

- the passage at column 25, lines 1-31, which relates

to *"Fixed formant and moving formant."*

Applicant has found no passage that discloses or infers

the features of *"applying to a temporal signal of an inverse*

variation of the pitch a temporal sampling of the sound signal

with a variable sampling step, this step varying with an inverse

value of the pitch variation" as defined in the instant claims 22

and 34 of the present invention.

The combination of HEIKKINEN and IKEDA thus does not lead to the features of the instant claims 22 and 34.

The use of time-warping algorithm as described in HEIKKINEN may produce artifacts that imply more processing stages to overcome the drawback. This, however, is time and cost consuming.

Figures 16 and 18 of IKEDA show the use of superimposing the impulse response signals one upon the other. Such a method also creates artifacts.

The other applied art references of ALLES and THYSSEN et al. do not address the deficiencies of HEIKKINEN and SU et al. discussed above.

One of ordinary skill and creativity would not produce a claimed embodiment of the present invention from a knowledge of HEIKKINEN and the secondary references, and a *prima facie* case of unpatentability has thus not been made.

These rejections are believed to be overcome, and withdrawal thereof is respectfully requested.

Conclusion

Prior art of record but not utilized is believed to be non-pertinent to the instant claims.

It is believed that the objections and rejections have been overcome, obviated or rendered moot, and that no issues remain. The Examiner is accordingly respectfully requested to

place the application in condition for allowance and to issue a Notice of Allowability.

Should there be any matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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